The effect of CEO inside debt holdings on financial reporting quality

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Abstract: This study investigates the effect of CEO inside debt holdings on financial reporting quality. I find that higher CEO inside debt holdings are associated with lower abnormal accruals, higher accruals quality, a lower likelihood of an earnings misstatement, and a lower incidence of earnings benchmark beating, suggesting that CEO inside debt promotes high financial reporting quality. Additional analyses reveal that (i) CEO inside debt holdings reduce firm-specific stock price crash risk, and that (ii) auditors are less likely to report a material internal control weakness for firms that have large CEO inside debt.

Keywords: CEO inside debt holdings, Abnormal accruals, Accruals quality, Earnings misstatement, Earnings target beating

JEL Classifications: M41 M52 G32

1. Introduction

This study investigates whether CEO inside debt holdings affect financial reporting quality. A vast literature on executive compensation focuses predominantly on bonus and equity-based compensation paid in the form of stocks, stock options, and other instruments whose value is tied to future equity returns. Far less research attention has been paid to the widespread practice of paying top executives with debt in the form of pension and deferred compensation though these constitute a significant portion of the executive compensation package. The payment structure of pension and deferred compensation resembles debt contracts, representing a fixed obligation for a firm to make future payments to corporate insiders and thus making executives long-term bondholders of that firm. Therefore the incentive plan is also termed "inside debt." The literature provides evidence that executive compensation components such as bonus, stock, and stock options do impact accounting choices. However, the effect of debt compensation incentives on financial reporting remains largely unexplored due to the limited reporting requirement for firms to disclose inside debt. As of December 15, 2006, the Securities and Exchange Commission (SEC) requires all firms to disclose in their proxy statements the annual accruals of pension benefits and the present value of accrued pension benefits for each of a firm's top five executives. Using the CEO pension and deferred compensation data available due to this regulatory change, this study empirically explores whether and how CEO debt compensation incentive is related to financial reporting quality.

Theories offer two competing hypotheses. On the one hand, inside debt could motivate managers to commit to high-quality financial reporting. Unlike equity holdings, inside debt holdings induce CEOs to refrain from risk-seeking and to take a longer view of a firm's future prospects, aligning CEO incentives with debtholder incentives. Prior studies (Jensen

and Meckling 1976; Edmans and Liu 2011) document that the value of inside debt depends on both the default risk and the liquidation value of a firm in the event of bankruptcy or reorganization. Hence inside debt-holders tend to avoid making decisions that increase the overall risk of a firm (Cassell et al. 2012). They are especially averse to downside risk that arises in a firm in the long run. In this vein, CEOs who have larger inside debt should care more about the riskiness and costs of financial misreporting that arise in the long term. Financial misreporting induces a high risk of subsequent detection and hence reputational loss along with litigation and regulatory actions to a firm (e.g., Ball and Shivakumar 2008). The reputational harm would make it difficult for a firm to finance or contract for its investments and operations in the future, and as a result, potential default risk of the firm could increase. Furthermore, financial misreporting may induce overinvestment in risky projects that increases corporate default risk (e.g., McNichols and Stubben 2008; Kedia and Philippon 2009; Kumar and Langberg 2009). Therefore firms with high CEO inside debt holdings should be less likely to commit financial misreporting.

Inside debt might exacerbate agency conflicts between managers and shareholders. Bebchuk and Jackson (2005) document that CEO debt compensation reduces pay-performance sensitivity and manifests itself in agency conflicts between shareholders and managers. If so, shareholders will demand higher financial reporting quality accordingly, whereby they can better monitor managers to curb any rent extraction. Therefore the role of inside debt in shareholder-manager conflict also lends support to the notion that inside debt increases financial reporting quality.

However, given that CEO inside debt reduces the equity-debt conflict, debtholders may demand less accounting conservatism, which in turn may result in an increased likelihood of financial misreporting. This plausible competing story may not hold in that the mitigating

effect of CEO inside debt on equity-debt conflict does not necessarily reduce debtholders' demand for conservative accounting. CEO inside debt and accounting conservatism may also work as complements, rather than substitutes, in curbing conflicts between shareholders and debtholders. I leave the association between CEO inside debt holdings and financial reporting quality as an open question and empirically test it in this study.

I follow Jensen and Meckling's (1976) theoretical framework and Wei and Yermack's (2011) approach to construct CEO relative leverage measure that captures CEO debt compensation incentives. CEO relative leverage is measured as the CEO's personal debt-to-equity ratio divided by corporate debt-to-equity ratio. When CEO relative leverage is above 1, the CEO will have an incentive alignment with debtholders and vice versa (e.g., Jensen and Meckling 1976; Wei and Yermack 2011; Edmans and Liu 2011). Based on the sample that contains CEO inside debt information from 2006 to 2011, I find that firms with higher CEO relative leverage exhibit a lower level of abnormal accruals, higher accruals quality, a lower likelihood of an earnings misstatement, and a lower incidence of meeting or beating analyst earnings forecasts. This is consistent with the notion that CEO inside debt promotes high financial reporting quality.

CEO compensation contracts and financial reporting quality could be endogenous. In particular, high-quality financial reporting increases investment efficiency (e.g., Easley and O'Hara 2004; Lambert et al. 2007; Biddle et al. 2009) and reduces the downside risk of a firm in the long run, which could in turn incentivize managers to hold more inside debt. To address this possibility, I adopt a two-stage regression approach with state individual tax rate as an instrument for CEO relative leverage. Since a higher individual tax rate would induce a CEO to defer income and the associated tax burden to a later period, CEO relative leverage is expected to be positively related to state individual tax rate. However, the individual tax rate

is unlikely to affect financial reporting quality, making it a valid instrument for testing the impact of CEO relative leverage on financial reporting quality. My results are robust to the instrumental variable estimation.

Given the positive link between CEO inside debt holdings and financial reporting quality, I conduct two additional analyses. Firstly, I test how CEO inside debt affects firm-specific stock price crash risk. The stock price crash is documented by prior literature to be the outcome of managers' hoarding bad news inside a firm (e.g., Jin and Myers 2006; Bleck and Liu 2007; Hutton et al. 2009). In essence, there exists an upper limit where it becomes too costly or difficult for managers to further withhold the bad news (Kothari et al. 2009), but managers usually cannot anticipate when the upper limit point will arrive. Once the tipping point is reached, all of the stockpiled bad news will come out all at once, resulting in a sudden and drastic decline in stock price, that is, a stock price crash (Hutton et al. 2009; Jin and Myers 2006). If high CEO inside debt contributes to high financial reporting quality, the information environment of a firm becomes more transparent, and thus there would be less latitude for bad news hoarding. As a result, the crash risk would be lower for firms that have high CEO inside debt holdings. Following Chen et al. (2001) and Hutton et al. (2009), I measure the stock price crash risk as the likelihood of negative, extreme firm-specific weekly returns over a fiscal year. The empirical results show that large CEO inside debt decreases firm-specific stock price crash risk, consistent with my prediction.

Secondly, I examine how CEO inside debt affects the likelihood that auditors attest to a material internal control weakness for a firm. If a firm with high CEO inside debt holdings is inclined to promote high quality of financial reporting, the firm should tend to improve its internal control over financial reporting. As a result, auditors would be more likely to perceive the firm as having low control risk and would be less likely to report a material

internal control weakness for the firm. Consistent with this notion, I find a significantly negative association between CEO inside debt holdings and the incidence of an auditor-attested material internal control weakness. Also, I find that large CEO inside debt is associated with a low likelihood of a material internal control weakness that is self-identified and disclosed by managers.

This study contributes to the literature in several ways. First, numerous theoretical and empirical studies analyze the relationship between managerial compensation contracts and accounting choices in terms of bonus incentive (e.g., Watts and Zimmerman 1986; Healy 1985; Gaver et al. 1995; Holthausen et al. 1995; Guidry et al. 1999; Murphy 2000) and equity incentive (e.g. Aboody and Kasznik 2000; Bartov and Mohanram 2004; Cheng and Warfield 2005; Bergstresser and Philippon 2006; Efendi et al. 2007; Jiang et al. 2009; Armstrong et al. 2013). Most of these studies find that bonus and equity compensation components induce managers to engage in accounting discretion. Still, the role of inside debt in financial reporting has received little attention, though debt-based compensation is distinct from other executive pay components. This study fills in this void by providing the first evidence on the impact of inside debt compensation on financial reporting quality. By showing that CEO inside debt curbs financial misreporting, this study has important implications for boards of directors, which contemplate compensation contracts for executives.

Second, prior literature (e.g., Shleifer and Vishny 1997; Bharath et al. 2008; Gul and Goodwin 2010; Chava et al. 2010) highlights the role of outside debt as a control mechanism for a firm to commit to high financial transparency. This study extends this literature by showing that, similar to outside debt, inside debt also promotes high quality financial reports. The finding complements the recent finance literature over the proposition that inside debt reduces agency cost of debt and contributes to efficient executive compensation contracting

(e.g., Bushman and Smith 2001; Sundaram and Yermack 2007; Wei and Yermack 2011; Edmans and Liu 2011).

In addition, this study provides the first evidence on the effect of CEO inside debt on firm-specific stock price crash risk, which adds to the recent stream of research on the economic consequences of CEO inside debt (e.g., Wei and Yermack 2011). Unlike these recent studies, which generally focus on the "mean-pricing" impact of CEO inside debt in terms of cost of capital and firm valuation, I focus on the stock price crashes, which provides additional insights into the market consequences of CEO inside debt. Also, this study provides new insight into how debt compensation incentives affect internal control quality, revealing that firms with large CEO inside debt tend to improve their internal control over financial reporting.

The remainder of the paper proceeds as follows. Section 2 develops the hypothesis. Section 3 describes the data collection procedure and the variable measures. Section 4 presents the research methodologies. Section 5 discusses the results. Section 6 conducts the additional tests, and section 7 concludes.

2. Related literature and hypothesis development

2.1. Related literature on the role of inside debt in mitigating agency conflict of debt

In most U.S. companies, the CEO inside debt obligation is unsecured and unfunded, exposing executives to the same default risk and insolvency treatment as outside creditors because inside debt holders have equal priority with other creditors over claiming liquidated assets in the case of bankruptcy. Hence inside debt serves as a curb on executives' risk-taking incentives and reduces agency cost of debt (e.g., Jensen and Meckling 1976; Sundaram and Yermack 2007; Wei and Yermack 2011; Edmans and Liu 2011).

Recent empirical and theoretical studies confirm the role of inside debt in mitigating the agency conflicts of debt. For instance, Edmans and Liu (2011) offer a theoretical framework to justify the use of inside debt as efficient compensation, showing that the inside debt not only reduces risk-shifting overinvestments but also induces executives to increase the liquidation value of a firm. Wei and Yermack (2011) and Bolton et al. (2010) show that high CEO inside debt holdings lead to an increase in bond price, which is attributed to the reduction of risk-shifting investment that transfers wealth from debtholders to shareholders. Tung and Wang (2010) focus on banking industry and find that high CEO relative leverage corresponds to lower stock return volatility and fewer high-risk investments such as mortgage-backed securities. Belkhir and Boubaker (2013) find that CEOs with larger inside debt hedge more their banks' interest rate risk, suggesting that inside debt mitigates bank executives' risk-taking incentives. Cassell et al. (2012) show that CEO inside debt holdings improve the incentive alignment between CEOs and debtholders by encouraging managers to implement less risky investments and financial policies. Furthermore, Anantharaman et al. (2012), Chen et al. (2011), and Chava et al. (2010) find fewer bond covenant restrictions and a lower cost of debt financing for firms that have larger CEO inside debt. Their empirical evidence also lends support to the notion that CEO debt compensation aligns the interests of managers with those of debtholders and reduces agency cost of debt.

2.2. The effect of CEO inside debt holdings on financial reporting quality

There might be tension over the theoretical link between CEO inside debt and financial reporting quality. On the one hand, high CEO inside debt holdings may induce high financial reporting quality. Prior research (e.g., Cheng and Warfield 2005) documents that the value of CEO equity holdings is tied to short-term stock price (i.e., the value of shares the CEOs are

about to sell), which motivates CEOs to focus on short-term prospects of a firm's performance. Also, the value of CEO equity holdings (particularly stock options) is sensitive to the volatility of stock price (e.g., Coles et al. 2006; Low 2009), which motivates CEOs to increase the riskiness of firm operations to increase their equity wealth. Consistent with this notion, a recent study by Armstrong et al. (2013) finds that the sensitivity of the managers' wealth to changes in risks (i.e., equity vega) is positively associated with financial misreporting that increases firm risk. In contrast, the value of inside debt is sensitive to the default probability and the liquidation value of a firm in the event of bankruptcy (Edmans and Liu 2011). Hence, unlike equity-based compensation, debt-based compensation induces CEOs to refrain from risk-taking and to take a longer term view of firm prospects, thereby leading to an incentive alignment between CEOs and debtholders. As documented in Cassell et al. (2012), to preserve firm value and reduce likelihood of default, CEOs who have larger inside debt tend to be more conservative in making corporate decisions, avoiding increases in the riskiness of firm operations.

Similarly, large inside debt-holders are sensitive to the riskiness and costs of financial misreporting. Financial misreporting exposes a firm to high risks of detection and reputational loss along with litigation and regulatory actions (e.g., Ball and Shivakumar 2008). Karpoff et al. (2008) find that substantial reputational penalties, which are defined as the expected loss in the present value of future cash flows due to lower sales and higher contracting and financing costs, are imposed on firms for financial misrepresentations. The reputational harm as regards the low financial reporting quality would attract enhanced scrutiny and queries from all external stakeholders and make it difficult for a firm to finance or contract for investment and operation activities in the future. As a consequence, firm value would decrease and default risk would increase. As CEOs with large inside debt are

concerned about the default risk and the recovery value in default, they should exhibit a strong commitment to maintaining high financial reporting quality.

Another negative consequence of financial misreporting, as theoretically and empirically evidenced in prior studies (e.g., Sadka 2006; McNichols and Stubben 2008; Kedia and Philippon 2009; Kumar and Langberg 2009), is that it induces overinvestment that increases a firm's default risk. In particular, managers, who unintentionally inflate reported financial performance, believe the misreported growth trend and will overinvest in the financial and product markets. Alternatively, managers, who intentionally boost reported accounting numbers, will overinvest in a high-risk approach to maintain consistency between misreported performance and investments (Sadka 2006; McNichols and Stubben 2008; Kedia and Philippon 2009). In a similar vein, managers deflating reported earnings may tend to underinvest. Conversely, high quality financial reporting improves capital investment efficiency by reducing adverse selection, liquidity risk, and information risk (e.g., Bushman and Smith 2001; Easley and O'Hara 2004; Lambert et al. 2007; Biddle et al. 2009), thereby guarding against financial distress for a firm in the long run. In sum, as large inside debt holders are averse to a firm's downside risk in the long run, they should be more sensitive to the negative consequences of financial misreporting that arise in the long run.

Inside debt reduces agency conflict of debt but may also exacerbate agency conflict between managers and shareholders. As documented by Bebchuk and Jackson (2005), CEO debt compensation reduces pay-performance sensitivity and aggravates agency cost of equity. If so, shareholders will increase their demand for high financial reporting quality, whereby they can more effectively monitor managers to prevent any opportunism and rent extraction. Furthermore, managerial rent extraction reduces the expected value of a firm's future cash flows and increases default risk, which in turn hurts debtholders. Hence, in this case, not only

shareholders but also debtholders will demand high financial reporting quality. The demand for financial reporting quality appears even greater for debtholders than for shareholders, as evidenced by Ball et al. (2008) and Jayaraman and Shivakumar (2013). On the whole, the role of inside debt in shareholder-manager conflict also lends support to the notion that inside debt increases financial reporting quality.

On the other hand, there is a plausible competing story. In particular, CEO inside debt mitigates agency conflict of debt and, as a result, may reduce outside debtholders' demand for accounting conservatism. Less conservative accounting may in turn induce more aggressive financial reporting. In this vein, we would expect a negative association between CEO inside debt and financial reporting quality.

Nevertheless, the competing story needs to be interpreted with caution. The attenuating effect of CEO inside debt on the debt-equity conflict does not necessarily reduce outside debtholders' demand for accounting conservatism. Creditors care about whether a firm can repay interest and principle and hence care about the firm's future cash flows. In addition to equity-debt conflict per se, the conflict between managers and other external stakeholders could also have a negative real effect on a firm's future stream of cash flows, which thereby has an indirect impact on debtholders' interests. If, say, managers divert resources from shareholders, or their relationships with their customers or suppliers deteriorate, the expected value of a firm's future cash flows would decrease, which impairs the firm's ability to repay interest and principle in the future.

Prior research documents that conservative accounting facilitates efficient contracting and mitigates the conflicts between managers and related parties such as shareholders (e.g., Lara et al. 2009), employees (e.g., Dhaliwal et al. 2013), suppliers, and customers (e.g., Hui et al. 2012), etc. If so, even though CEO inside debt mitigates equity-debt conflict, creditors

could still have great demand for accounting conservatism on account of the other possible conflicts of interests, i.e., those between managers and other stakeholders, which may cause a decrease in a firm's future cash flows. In this scenario, CEO inside debt by no means could substitute accounting conservatism in safeguarding outside debtholders' interests. Instead, accounting conservatism and CEO inside debt work together to align the interests of shareholders and debtholders. Accordingly, large CEO inside debt should not induce less accounting conservatism. Instead, if inside debt does prompt CEOs to reduce default risk (Wei and Yermack 2011; Edmans and Liu 2011), the CEOs may instead adopt relatively more conservative accounting to prevent risky and value-destroying investments.[1]

In spite of the dubious competing story, this study still acknowledges an empirical issue about whether high CEO inside debt leads to high financial reporting quality. Accordingly, I lay out my hypothesis in a null form as follows.

H1: *CEO inside debt holdings are related to financial reporting quality.*

3. Data and Variable measures

3.1. Sample and data source

The empirical analyses are based on the data gathered primarily from five sources: ExecuComp, Compustat, CRSP, Audit Analytic, and RiskMetric. I start the sample construction process with the ExecuComp database, which provides the data on the present value of accumulated pension benefits and the aggregate balance of non-qualified deferred compensation for each top executive at the S&P 1500 companies. Starting from December 15, 2006, the Securities and Exchange Commission (SEC) required public firms to disclose

[1] See Ball and Shivakumar (2005), Francis and Martin (2010), Jayaraman and Shivakumar (2013), Roychowdhury (2010), and Bushman et al. (2011), for instance, for the details on how accounting conservatism could curb risky and value-destroying investment activities of a firm.

detailed information about the computation and value of executive pension benefits and deferred compensation. Thus my sample period ranges from 2006 to 2011.

The initial sample extracted from ExecuComp consists of firm-year observations for the S&P 1500 firms that contain CEO inside debt information over the sample period. I further require that firms have necessary data from CRSP, Compustat, Audit Analytic, and RiskMetric to construct the variables of interest in the empirical analyses. The final sample ends up with 5596, 4238, 7547, and 5685 firm-year observations (corresponding with 1285, 1137, 1680, and 1572 unique firms) for testing the impact of CEO inside debt holdings on abnormal accruals, accruals quality, earnings misstatement, and earnings benchmark beating (the proxies for financial reporting quality to be discussed in section 3.3), respectively.[2]

3.2. CEO inside debt measure

Prior studies (e.g., Jensen and Meckling 1976; Sundaram and Yermack 2007; Edmans and Liu 2011) document that inside debt compensation aligns CEO incentives with debtholder incentives. The incentive alignment varies with the relative weight of debt- versus equity-based compensation in the executive pay structure. The higher the CEO's personal leverage is relative to the firm leverage (i.e., CEO relative leverage), the higher is the likelihood that CEO incentives are aligned with those of debtholders. Jensen and Meckling (1976), Sundaram and Yermack (2007), and Edmans and Liu (2011) theorize that, when CEOs' personal debt-to-equity ratio exceeds corporate debt-to-equity ratio (i.e., the relative

[2] The difference in the number of firm-year observations for the final sample is due to the data requirements in constructing different financial reporting quality proxies for the regression analyses. For instance, to construct an abnormal accruals variable using the modified Jones model, observations in a two-digit SIC-code industry that has less than 20 firms for a year are excluded. In constructing an earnings benchmark beating variable, observations with no analyst earnings forecasts for a fiscal year are eliminated. In addition, the number of unique firms in my sample could exceed 1500 because the classification on S&P 1500 firms changes over years in the sample period.

leverage ratio exceeds 1), the CEOs will have an incentive alignment with debtholders and vice versa.

Accordingly, following Sundaram and Yermack (2007) and Wei and Yermack (2011), I construct a dummy variable, *InsiDebt,* which takes value of 1 if CEO relative leverage exceeds 1 and 0 otherwise. This dummy not only captures any nonlinearity in the relationship between CEO relative leverage and financial reporting quality but also addresses a potential outlier problem. One may argue that the level of CEO equity holdings per se from the denominator could also induce the positive association between CEO relative leverage ratio and financial reporting quality. In this case, the empirical results could be driven by CEO equity rather than CEO debt. This concern, however, is minimal because a recent study by Armstrong et al. (2013) shows that it is equity vega, rather than equity delta and equity ownership, that induces CEO incentives to misreport. Still, to ensure that the association between CEO relative leverage and financial reporting quality does not result from merely the flip side of the positive relation between equity incentive and financial misreporting, I control for CEO equity ownership and equity vega in the multivariate analyses. My use of the indicator variable, which is based on whether the CEO relative leverage exceeds the key cut-off point of 1, also mitigates the potential flip-side effect of CEO equity holdings.

Following prior research, I measure CEO relative leverage as the ratio of CEO personal leverage to firm leverage. The CEO personal leverage is defined as the value of inside debt holdings divided by the value of CEO equity holdings, where the former equals the sum of the actuarial present value of accumulated benefits under defined-benefit pension plans and the total balance in the deferred compensation plans by the fiscal year-end, and the latter equals the value of CEO stock and stock option holdings (details on the calculation are

provided in appendix II).[3] The firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity at the fiscal year end.[4] Table 1 shows the descriptive statistics of *InsiDebt*. The mean value is 21.61%. Thus the majority of the sample observations have CEO relative leverage ratio below 1, which is consistent with Wei and Yermack (2011).

In addition, I adopt another inside debt measure developed by Wei and Yermack (2011), that is, the CEO relative incentive ratio. This ratio estimates the marginal increase in CEO inside debt over the marginal increase in CEO inside equity, given a one-dollar increase in firm value, scaled by the marginal increase in firm debt over the marginal increase in firm equity, given the same one-dollar increase in firm value. Likewise, if the CEO relative incentive ratio exceeds 1, CEO incentives are aligned with debtholder incentives and vice versa (Wei and Yermack 2011). Accordingly, I construct an indicator variable based on whether the relative incentive ratio exceeds 1.[5] Its mean value (not tabulated) amounts to 0.2241. The use of this alternative measure of CEO compensation incentive does not change the inferences drawn in all the empirical analyses.

3.3. Proxy for financial reporting quality

[3] It is difficult to determine the deferred compensation investment choices of individual CEOs in a systematic manner because the disclosure requirements are ambiguous (Wei and Yermack 2011). So following Cassell et al. (2012), I assume that CEOs do not invest their deferred compensation in the common stocks. In untabulated sensitivity tests, I alternatively assume that all CEOs are required to invest 100% of their deferred compensation in common stocks. Accordingly, I adjust the relative leverage ratio by shifting the aggregate amount of deferred compensation from CEO debt holdings to CEO equity holdings. Use of this alternate variable specification does not change any inference in the paper.

[4] I obtain qualitatively the same results if I use firm leverage which is defined as the sum of long-term debt and debt in current liabilities divided by the sum of market value of stockholders' equity and fair market value of outstanding stock options.

[5] I do not describe the detailed procedure of estimating the CEO relative incentive ratio, as I follow exactly the same procedure as that of Wei and Yermack (2011).

This study considers four proxies for financial reporting quality: (i) abnormal accruals, (ii) accruals quality, (iii) earnings misstatement, and (iv) earnings target beating, which are commonly used in a large body of accounting literature (Dechow et al. 2010).

The first proxy is the absolute value of abnormal accruals (|*DA*|), estimated using the cross-sectional modified Jones model with at least 20 firms for each year and two-digit SIC-code industry (Dechow et al. 1995). The modified Jones model assumes that accruals are determined by operational fundamentals such as revenues and fixed assets, and any deviations from such fundamentals are attributed to managerial accounting manipulation. High (low) value of |*DA*| corresponds to low (high) financial reporting quality. |*DA*| captures both income increasing and income decreasing opportunistic discretion. Nevertheless, one may argue that overstatement of earnings is far more detrimental to a firm than understatement of earnings and thus outsiders are generally concerned about the former. So I also adopt signed abnormal accruals as a complementary measure of the quality of a firm's financial report.

I further consider two alternative measures of abnormal accruals estimated by another two approaches. First, I follow Kothari et al. (2005) to construct performance-matched abnormal accruals since they argue that a performance-matched accruals measure mitigates type I errors. Second, Ball and Shivakumar (2006) argue that the conventional linear accruals models (e.g., the modified Jones model), which ignore the roles of accruals in timely loss recognition, misspecify the accounting accruals process and misestimate the abnormal and normal components of accruals. They find that piecewise-linear regression, which incorporates the asymmetric gain and loss recognition role of accruals, substantially increases the explanatory power of accruals model. Following the abnormal accruals model developed by Ball and Shivakumar (2006), I use both book-based and market-return-based gain and loss

proxies to construct the piecewise-linear regression estimates for my second alternative measure of abnormal accruals. My results are insensitive to both of the alternative specifications of abnormal accruals.

The second proxy for financial reporting quality is accruals quality, which represents the degree to which accruals map into current, past, and future cash flows (Dechow and Dichev 2002; Francis et al. 2005). The better the mapping, the higher a firm's financial reporting quality. Francis et al. (2005) suggest that the cross-sectional Dechow and Dichev (2002) model used to attain the accruals quality measure can be improved by controlling for growth in revenues and the level of property, plant, and equipment. I follow the Francis et al.'s (2005) approach to derive the accruals quality measure (which is termed *DD*). *DD* captures the extent to which accruals do not map into cash flows and is an inverse measure of financial reporting quality.

The third proxy pertains to earnings misstatements as numerous studies (e.g., Desai et al. 2006; Ecker et al. 2006) identify an earnings misstatement as a potent indicator for low financial reporting quality.[6] I set a dummy variable, *Res*, indicating whether a firm has had an earnings misstatement for a fiscal year. Firms with high financial reporting quality would have a low likelihood of an earnings misstatement.

The last proxy for financial reporting quality is earnings target beating. A stream of prior research (e.g., Dhaliwal et al. 2004; Moehrle 2002; McVay et al. 2006; Ayers et al. 2006) provides evidence that earnings are likely managed when firms just meet or beat analyst earnings forecasts. Furthermore, based on a large body of literature on the observed determinants and consequences of earnings target beating, Dechow et al. (2010) argue that,

[6] Another proxy for financial reporting quality is the indicator for whether the SEC publishes an Accounting and Auditing Enforcement Release (AAER) that identifies accounting fraud or misrepresentation that occurs for a firm over a fiscal year. Unfortunately, there are less than 50 AAER firm-year observations in my sample, which prevents me from drawing valid statistical inferences from the multivariate results. Thus I do not use AAERs as the proxy for financial reporting quality.

compared to other target beating such as *small profits* and *small loss avoidance*, meeting or beating analyst earnings forecasts better indicates earnings management and is yet another important dimension of financial reporting quality.[7] Therefore I focus on the likelihood of meeting or beating analyst earnings forecasts to measure financial reporting quality. The summary statistics of the financial reporting quality measures are provided in Table 1 and comparable to those reported in prior literature (e.g., Ayers et al. 2011; Doyle et al. 2007; Armstrong et al. 2013, among others).

4. Research Design

4.1. The effect of CEO inside debt holdings on financial reporting quality

To test the impact of CEO inside debt holdings on abnormal accruals and on accruals quality, I conduct the following pooled OLS regression model.

$$|DA| \ (or\ DA, DD) = \alpha_0 + \alpha_1 InsiDebt + \alpha_2 Controls + \varepsilon \quad (1)$$

$|DA|$ is the absolute value of abnormal accruals, estimated using the modified Jones model with at least 20 firms for each year and two-digit SIC-code industry (e.g., Dechow et al. 1995). *DA* is the signed value of the abnormal accruals. *DD* is the standard deviation of residuals from the modified Dechow and Dichev model proposed by Francis et al. (2005). Larger *DD* indicates poorer accruals quality. *InsiDebt* is an indicator variable for CEO relative leverage, as defined previously. The control variables consist of two main categories. The first category comprises corporate governance characteristics, which include CEO equity ownership (*CEOowner*), institutional ownership (*Insti*), the sum of independent director ownership (*IndpShare*), the proportion of independent directors (*Indp*), and the presence of Big-4 auditors (*Big4*) (e.g., Ayers et al. 2011). I further include the sensitivity of managers' wealth to changes in equity risk (*Vega*) because equity vega may dominate equity delta in

[7] See Dechow et al. (2010) for detailed literature review on earnings target beating.

creating managerial incentives to misreport financial information (Armstrong et al. 2013). The second category comprises financial and market-based variables that may affect managers' incentives to manage earnings. These variables include return on assets (*ROA*), a loss dummy (*Loss*), long-term debt-to-assets (*Debt*), market-to-book ratio (*Mb*), firm size (*Size*), sales growth (*Salesgrowth*), cash flow volatility (*StdCash*), and sales volatility (*StdSales*) (e.g., Klein 2002; Hribar and Nichols 2007; Zhao and Chen 2008; Ayers et al. 2011). All the control variables are defined in appendix I. If CEO inside debt induces high quality of financial reports, the coefficient on *InsiDebt* should be significantly negative.

Next, to test the impact of CEO inside debt holdings on the incidence of an earnings misstatement and on the likelihood of meeting or beating analyst earnings forecasts, I use the following pooled probit regression model.

$$\mathrm{Re}\,s\ (or\ AnaSur) = \alpha_0 + \alpha_1 InsiDebt + \alpha_2 Controls + \varepsilon \qquad (2)$$

Res takes value of 1 if a firm misstates its financial report for a fiscal year and 0 otherwise. *AnaSur* equals 1 when a firm meets or beats by 1 percent the median consensus analyst earnings forecast as reported in I/B/E/S database over a fiscal year and 0 otherwise. A higher incidence of an earnings misstatement or a higher likelihood of meeting or beating analyst earnings forecasts is associated with lower financial reporting quality. So if the positive link between CEO inside debt and financial reporting quality holds for H1, α_1 should take on a negative sign. The control variables in model (2) are the same as those included in model (1) and are defined in appendix I.

Financial reporting quality and CEO inside debt may be endogenously determined by certain unobservable CEO characteristics (say, high-quality financial reports might be motivated by CEOs' preferences of holding large inside debt), which biases the coefficient estimates in model (1) and (2). Furthermore, as executive pension and deferred compensation

plans are negotiable and usually based on not only years of service but also pre-retirement salaries, CEOs could negotiate their compensation contracts to obtain a higher or lower level of debt compensation (Lee and Tang 2011). High financial reporting quality increases investment efficiency and decreases downside risk of a firm in the long run, which could incentivize managers to hold more inside debt of the firm. Thus a reverse causality problem arises in the way that high financial reporting quality leads to high inside debt holdings. To alleviate the endogeneity, I employ a two-stage instrumental variable regression approach.

Defined pension benefits and deferred compensation package benefit CEOs by deferring their personal income and associated tax to a later period. These benefits increase with the marginal tax rate faced by the CEOs (Scholes et al. 2002). So CEOs subject to higher marginal tax rates on their personal income have a stronger incentive to defer compensation, resulting in higher inside debt holdings. In this regard, I use the individual tax rate of the state in which a firm is headquartered as the instrumental variable for CEO inside debt. The state individual tax rate satisfies the condition of being a valid instrument in that it affects CEO inside debt but is unlikely to influence financial reporting.

The following probit regression model is specified as the first-step estimate for the two-stage instrumental regression analysis.

$$InsiDebt = \alpha_0 + \alpha_1 StateWage + \alpha_2 StateInterest + \alpha_3 Controls + \varepsilon \quad (3)$$

The dependent variable, *InsiDebt*, is a dummy variable that equals 1 if CEO relative leverage ratio exceeds 1 and 0 otherwise, where the CEO relative leverage ratio is as defined previously. The instrumental variables include the maximum tax rate for wages (*StateWage*) and the maximum mortgage subsidy rate (*StateInterest*) faced by a CEO in the state of the firm's headquarters. *StateWage* is expected to be positively related to *InsiDebt*. *StateInterest* is expected to be negatively associated with *InsiDebt* since the mortgage subsidy reduces the

CEOs' overall tax burden. The standard two-stage instrumental variable approach requires control variables in the first-stage regression to be the same as those specified in the second-stage regression. Hence the control variables in model (3) are the same as those included in model (1) and (2). The bootstrapping procedure is employed for the second-stage regression to obtain consistent estimators (Imbens and Wooldridge 2007). As with Bae et al. (2011) and Deng et al. (2013), I use the bootstrapped standard errors to conduct statistical inferences. The standard errors are estimated using 500 bootstrap replications.

5. Empirical Results

5.1. Univariate results

Table 2 shows the univariate results for the hypothesis tests. The mean |*DA*| (*DA*) is 0.0175 (0.0057) for the high *InsiDebt* subsample, which is significantly lower than that for the low *InsiDebt* subsample (t-stat.=-3.83 (-3.98)). This indicates that firms with high CEO relative leverage generally have lower abnormal accruals than firms with low CEO relative leverage. The mean difference of -0.0092 (-0.0098) in |*DA*| (*DA*) between the two subsamples accounts for 37.25% (73.13%) of the mean value of |*DA*| (*DA*) for the whole sample (i.e., 0.0247 (0.0134) reported in Table 1) and thus is economically significant. The average *DD* for firms with high *InsiDebt* is significantly lower by 4.50 percentage points (t-stat.= -9.74) than the average *DD* for firms with low *InsiDebt*, indicating lower accruals quality for firms that have high CEO relative leverage. The mean difference of -0.0450 in *DD* accounts for 36.64 percent of the average *DD* for the whole sample and hence is economically significant. The incidence of an earnings misstatement is significantly lower for firms with high *InsiDebt* compared to firms with low *InsiDebt* (0.0490 versus 0.0871, t-stat.=-5.86), indicating that firms with high CEO relative leverage have a lower incidence of an earnings misstatement.

The mean difference in *Res* between the two subsamples is -0.0380, which accounts for 48.22 percent of the sample mean of *Res* and thus is economically significant. Overall, the univariate results lend initial support to the notion that high CEO inside debt holdings lead to high financial reporting quality.

5.2. Multivariate regression results

Table 3 reports the regression results for the test of the impact of CEO inside debt holdings on abnormal accruals. Under both |*DA*| and *DA* model, the coefficients on *InsiDebt* are negative and highly significant at the 1% level (t-stat.=-2.98 and -3.59, respectively). This indicates that firms with higher CEO inside debt holdings are less likely to engage in accounting discretion. A one standard deviation increase in *InsiDebt* leads to a decrease in |*DA*| (*DA*) by 0.0033 (0.0040), which accounts for 13.36% (29.85%) of the mean value of |*DA*| (*DA*) for my sample and is economically significant. The coefficients on *Debt* are also negative and significant at the 1% level, indicating that higher outside debt holdings lead to less accounting discretion. This reconciles with the prior evidence (e.g., Shleifer and Vishny 1997; Bharath et al. 2008) as to the role of outside debt as a mechanism for a firm to commit to high financial transparency. The coefficients on *ROA* are significantly positive at the 1% level, which is consistent with prior findings (e.g., Dechow et al. 1995) that abnormal accruals are positively related to earnings performance. The coefficient on *Insti* takes on a positive sign and is statistically significant in the *DA* model, which reconciles with the prior view (e.g., Bushee 2001) that institutional investors could pressure managers into managing earnings to achieve short-term earnings growth.

Table 4 presents the regression results for the test of the impact of CEO inside debt holdings on accruals quality. *InsiDebt* has a negative and statistically significant coefficient

(t-stat.=-3.97), indicating that large CEO inside debt increases accruals quality. A one standard deviation increase in *InsiDebt* decreases *DD* by 0.0138, which accounts for 11.24 percent of the sample mean of *DD* and thus is economically significant. *CEOowner* is positively associated with *DD*, which reconciles with the prior evidence (e.g., Bergstresser and Philippon 2006) that higher CEO equity ownership is associated with lower accruals quality. As expected, *Stdcfo* has a significantly positive coefficient, suggesting that firms with higher operational risk tend to have lower accruals quality. *Indp* and *Debt* are both statistically significant in the expected negative sign, which suggests that more outside debt or more independent directors contribute to higher accruals quality. Consistent with prior studies (e.g., Francis et al. 2008), the coefficient for *ROA* is significantly negative, suggesting that high operating efficiency reflected by high ROA is associated with low volatility of accruals and high accruals quality.

Table 5 presents the regression results for the test of the impact of CEO inside debt holdings on the incidence of an earnings misstatement. The coefficient on *InsiDebt* is significantly negative at the conventional 5% level, indicating that firms with higher CEO inside debt holdings are less likely to misstate earnings. The marginal effect of *InsiDebt*, d(Prob.*Res*)/d(Std.*InsiDebt*), amounts to -2.14%, which indicates that a one standard deviation increase in *InsiDebt* decreases the likelihood of an earnings misstatement by 2.14 percentage points. The decrease of 0.0214 accounts for 27.16 percent of the sample mean of *Res* and is economically significant. The negative impact of the CEO relative leverage is also evident when the dependent variable is replaced by an indicator variable coded as 1 for firms that have an intentional misstatement (i.e., a misstatement caused by irregularities rather than unintentional errors).

The coefficient on *Debt* is significantly negative, which again lends support to creditors' effective monitoring of a firm's financial reporting. *Indp* also has a significantly negative coefficient, indicating that more independent directors lead to a lower likelihood of an earnings misstatement. *StdSales* has a significantly positive coefficient, suggesting that high operational uncertainty characterized by high sales volatility leads to a high incidence of an earnings misstatement. *Loss* (*Size*) takes on a significantly positive (negative) coefficient, indicating that loss (big) firm tend to have a high (low) incidence of an earnings misstatement. The coefficient for *Big4* is positive and statistically significant, suggesting that Big-4 auditors are more capable of detecting earnings misstatements than non-Big-4 auditors.

Table 6 shows the regression results for the test of the impact of CEO inside debt holdings on the likelihood of meeting or beating analyst earnings forecasts. The coefficient for *InsiDebt* is negative and statistically significant at the conventional 5% level, suggesting that firms with larger inside debt have a lower incidence of meeting or beating analyst earnings forecasts. The marginal effect of *InsiDebt*, d(Prob.*AnaSur*)/d(Std.*InsiDebt*), amounts to -2.13%, indicating that a one standard deviation increase in *InsiDebt* leads to a decrease in the likelihood of meeting or beating analyst earnings forecasts by 2.13 percentage points. The decrease of 0.0213 accounts for 22.47 percent of the sample mean of *AnaSur* and thus is economically significant. As expected, the coefficients for *Debt* and *Loss* are negative and statistically significant, which indicates that firms with high outside debt holdings or negative operating income tend to have a low incidence of meeting or beating analyst earnings forecasts. The coefficient on *Size* is significantly positive, suggesting that larger firms are more capable of managing earnings to meet or beat analyst earnings forecasts. By and large, the multivariate results in Table 3-6 support the prediction that larger CEO inside debt is associated with higher financial reporting quality.

Table 7 presents the two-stage regression results for the hypothesis tests. In the first-step probit estimation, CEO relative leverage (*InsiDebt*) is significantly positively related to the state individual income tax rate (*StateWage*) and negatively associated with the mortgage subsidy rate (*StateInterest*). This is consistent with the notion that CEOs who are subject to high individual income tax prefer debt compensation and thereby contribute to high relative leverage of their firms. The partial F-statistics are all well above the cutoff point of 11.59 and statistically significant at the 0.1% level, suggesting that the models are not subject to weak instrument problems (Stock et al. 2002; Larcker and Rusticus 2010).[8] The second-step regression results for |*DA*|, *DA*, *DD*, *Res*, and *AnaSur* models all show a significantly negative coefficient for the fitted CEO relative leverage (*InsiDebt*). This corroborates that the regression results reported in Table 3-6 are robust to correcting for endogeneity and that the positive association between CEO relative leverage and financial reporting quality is not driven by unobservable firm/CEO characteristics.

The firm-fixed effect model is widely used in empirical research to control for cross-sectional heterogeneity and to mitigate endogeneity problems. However, an effective firm-fixed effect model requires that the dependent variable display sufficient within-firm variation over time (Wooldrige 2000). Unlike |*DA*| and *DA*, which are calculated for an annual interval, *DD* is computed over a five-year rolling window and thus has little time-series variation. *Res* and *Anasur*, which are binary variables, also lack time-series variation. Hence, as a supplementary test, I apply the firm-fixed effect model only to the |*DA*| and *DA* specifications. The firm-fixed effect regression results (not tabulated) are qualitatively the same as those reported in Table 3.

[8] According to Stock et al. (2002), when there are two instruments in the first-stage regression, the F-statistic for the instruments needs to be above 11.59 to reject the null hypothesis that the instruments are weak.

6. Additional Tests

6.1. The effect of CEO inside debt holdings on firm-specific stock price crash risk

This section investigates the effect of CEO inside debt holdings on firm-specific stock price crash risk. A stock price crash results from the hoarding of bad news within a firm. Recent theoretical and empirical evidence (Jin and Myers 2006; Bleck and Liu 2007; Hutton et al. 2009; Kim et al. 2011) reveals that high financial reporting quality mitigates firm-specific stock price crash risk. If CEO inside debt contributes to high financial reporting quality, firms would have greater transparency and less latitude in hoarding bad news. Accordingly, stock price crash risk should be lower for firms with larger CEO inside debt. To test the prediction, I employ the following pooled probit regression model.

$$\begin{aligned} Crash = {} & \alpha_0 + \alpha_1 InsiDebt + \alpha_2 Tradevol + \alpha_3 Stdret + \alpha_4 Meanret + \\ & \alpha_5 Size + \alpha_6 Mb + \alpha_7 Debt + \alpha_8 ROA + \alpha_9 Salesgrowth + \alpha_{10} Insti + \varepsilon \end{aligned} \quad (4)$$

Crash is an indicator variable for whether a firm experiences one or more firm-specific weekly returns falling 3.2 standard deviations below the mean firm-specific weekly returns over a fiscal year, where the firm-specific weekly returns measure follows Hutton et al. (2009).[9] *InsiDebt* is an indicator variable for CEO relative leverage which is defined previously.

Following Chen et al. (2001), Hutton et al. (2009), and Kim et al. (2011), I control for the standard deviation of firm-specific weekly returns (*StdRet*), the mean of firm-specific weekly returns (*MeanRet*), the average monthly share turnover (*Tradevol*), firm size (*Size*), market-to-book ratio (*Mb*), return on assets (*ROA*), sales growth (*Salesgrowth*), institutional ownership (*Insti*), and firm leverage (*Debt*). All the control variables are defined in appendix

[9] The results qualitatively hold if I measure the stock price crash risk by the negative skewness of firm-specific weekly stock returns over a fiscal year (Kim et al. 2011).

I. Model (4) links the proxies for crash risk in fiscal year *t* to the CEO inside debt measure in fiscal year *t*-1 and to the set of control variables in fiscal year *t*-1.

Table 8 presents the regression results. The coefficient on *InsiDebt* is statistically significant with an expected negative sign (-0.0917 with *p*=0.018), which supports the prediction that CEO inside debt holdings reduce firm-specific stock price crash risk. The marginal effect of *InsiDebt*, d(Prob.*Crash*)/d(Std.*InsiDebt*) (not tabulated), amounts to -3.1%. This indicates that a one standard deviation increase in *InsiDebt* decreases the incidence of a stock price crash by 3.1 percentage points, which accounts for 15.38 percent of the sample mean of *Crash* and is economically significant. The results remain qualitatively unchanged if I employ a two-stage instrumental regression for the *Crash* model. Consistent with Chen et al. (2001), *Size* and *StdRet* have a significantly positive coefficient, indicating that larger or more volatile stocks are more likely to experience a stock price crash. Surprisingly, higher ROA is associated with higher crash risk. This might be because high reported operating performance could be ascribed to accounting discretion. As expected, the coefficients on *Debt*, *Salesgrowth*, and *MeanRet* are negative and statistically significant at the conventional level, indicating that stock price crash risk is lower for firms that have larger outside debt, higher sales growth, or higher average weekly stock returns within a year.

6.2. The effect of CEO inside debt holdings on the incidence of an auditor-attested material internal control weakness

Section 404 of Sarbanes-Oxley Act (SOX) and the Public Company Accounting Oversight Board (PCAOB) both require companies to maintain sufficient internal control over financial reporting and to provide periodic auditor-attested assessment of internal control effectiveness. The internal control is designed to assure the accuracy and reliability of

accounting information. Weak internal control would bring about material errors in a firm's financial reports. Prior research (e.g., Doyle et al. 2007; Ashbaugh-Skaif et al. 2009) documents that ineffective internal control allows or introduces both intentional and unintentional misstatements into financial reporting, thereby resulting in lower accruals quality. Feng et al. (2009) show that ineffective internal control also reduces the quality of internal financial reports, which in turn leads to less accuracy of management earnings guidance. Ashbaugh-Skaife et al. (2009) and Kim et al. (2011) also contend the positive impact of effective internal control on the quality of financial reporting.

To the extent that firms with high CEO inside debt holdings are inclined to promote high financial reporting quality, they should have an incentive to improve their internal controls. Accordingly, auditors are likely to consider the firms as having low control risk, that is, auditors are less likely to report a material internal control weakness for firms that have large CEO inside debt. Therefore large CEO inside debt is expected to be negatively associated with the incidence of an auditor-attested material internal control weakness. I use the following pooled probit regression model to test the prediction.

$$\begin{aligned} ICW404 = {} & \alpha_0 + \alpha_1 InsiDebt + \alpha_2 Auditchange + \alpha_3 Firmage + \alpha_4 Loss + \\ & \alpha_5 ROA + \alpha_6 Numseg + \alpha_7 ForeignTran + \alpha_8 Mb + \alpha_9 Salesgrowth + \\ & \alpha_{10} \mathrm{Re}struct + \alpha_{11} Indp + \alpha_{12} IndpShare + \alpha_{13} Insti + \alpha_{14} Big4 + \varepsilon \end{aligned} \quad (5)$$

ICW404 takes value of 1 if a firm has a material internal control weakness attested to by auditors under SOX Section 404 over a fiscal year and 0 otherwise. Since auditor change is associated with weak internal control (e.g., Zhang et al. 2007; Hoitash et al. 2009), I control for *Auditchange*, which equals 1 if a firm changes its auditor for a fiscal year and 0 otherwise. As prior studies (e.g., Hoitash et al. 2009) document that poorly governed firms are more likely to have weak internal controls, I include the same four corporate governance variables as those included in model (1), namely, *Indp*, *IndpShare*, *Insti*, and *Big4*. Other control

variables include firm age (*Firmage*), financial health (proxied by *loss* and *ROA*), firm complexity (proxied by *Numseg* and *ForeignTran*), growth (proxied by *Mb* and *Salesgrowth*), and firm restructuring (*Restruct*), which relate to a firm's internal control quality (Doyle et al. 2007). All the control variables are defined in appendix I.

Table 9 reports the regression results. The coefficient on *InsiDebt* is negative and significant at the 5% level (-0.2050, p=0.045), which is consistent with the prediction that higher managerial ownership of debt is associated with a lower likelihood of an auditor-attested material internal control weakness. The marginal effect of *InsiDebt* (not tabulated) indicates that a one standard deviation increase in *InsiDebt* significantly decreases the incidence of an auditor-attested material internal control weakness by up to 5.2 percentage points. The results are not sensitive to the two-stage instrumental regression estimation. The coefficients on *Auditchange*, *Numseg*, *Loss*, and *Indp* are statistically significant in the expected sign after controlling for the endogeneity. This indicates that auditors are more likely to attest to a material internal control weakness for firms that have an auditor switch, more business segments, a loss in operating income, or fewer independent directors.

Pursuant to Section 303 of SOX and Item 307 of Regulation S-K, managers are also required to disclose a material internal control weakness whenever they observe such weakness. So I rerun equation (5) where the dependent variable is replaced with *ICW303*. *ICW303* equals 1 if a firm discloses a self-identified material internal control weakness over a fiscal year and 0 otherwise. The results (not tabulated) indicate that larger CEO inside debt leads to a lower likelihood of a material internal control weakness. Hence the results on *ICW303* complement the results on *ICW404* in revealing that inside debt does motivate managers to improve internal controls to prevent financial misreporting.

7. Conclusion

Numerous studies have documented that executive bonus and equity compensation creates managerial incentives to engage in accounting discretion. Overlooked almost entirely is the role of executive debt compensation in financial reporting due to the limited disclosure of executive debt compensation components. Using the CEO pension and deferred compensation data available from 2006 to 2011, this study provides the first evidence on how CEO inside debt affects financial reporting quality.

Theory offers competing predictions. On the one hand, inside debt holders focus on a firm's long-term prospect and are risk-averse. Hence CEOs with much inside debt are sensitive to the negative consequences of financial misreporting arising in a firm in the long run and tend to refrain from financial misreporting. In addition, CEO inside debt may exacerbate the agency conflict of equity, increasing shareholders' demand for high financial reporting quality. But on the other hand, CEO inside debt mitigates equity-debt conflicts and may reduce creditors' demand for conservative accounting, which thereby leads to a higher likelihood of misreporting. Overall, the empirical findings support the first prediction. In particular, firms with higher CEO inside debt holdings exhibit lower abnormal accruals, higher accruals quality, a lower likelihood of an earnings misstatement, and a lower incidence of meeting or beating analyst earnings forecasts. This suggests that high CEO inside debt holdings induce high quality financial reporting. Furthermore, I find that CEO inside debt holdings mitigate the stock price crash risk of a firm, which is consistent with the rationale that larger CEO inside debt leads to higher financial transparency and less latitude in bad news hoarding within a firm. I also find that firms with higher CEO inside debt holdings have a lower likelihood of an auditor-attested material internal control weakness, suggesting that

firms with large CEO inside debt are less likely to have a material weakness in internal control over financial reporting.

Overall, by corroborating the role of inside debt in promoting high financial reporting quality and in mitigating stock price crash risk and internal control weakness, this study highlights the importance of inside debt in the design of an optimal executive compensation contract, which should be of particular interests to board of directors. This paper, however, is subject to two limitations. First, despite efforts to address endogeneity, I cannot completely eliminate it. Second, CEOs may not have a long-term focus for future firm prospect if their inside debt is close to "maturity." But unlike outside debt, inside debt has no explicit maturity date because the expected retirement ages of CEOs are quite uncertain. In the United States, there is no mandatory retirement age for CEOs, and CEOs can work as long as they are qualified for the job position. Also, the future year in which a CEO wishes to retire may keep changing over time. Due to this uncertainty, the inside debt maturity information is not readily available. This prevents me from further investigating whether the positive effect of CEO inside debt holdings on financial reporting quality is weaker for short-term CEO inside debt. I leave this question as an avenue for future research.

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Table 1 Descriptive statistics

	Mean	Std.dev.	Median	Num. of firm-years	Num. of unique firms
Main variables					
|DA|	0.0247	0.1346	0.0115	5596	1285
DA	0.0134	0.1362	0.0072	5596	1285
DD	0.1228	0.1650	0.0704	4238	1137
Res	0.0788	0.2695	0	7547	1680
AnaSur	0.0948	0.2930	0	5685	1572
InsiDebt	0.2161	0.4116	0	7547	1680
Control variables					
Insti	0.7681	0.2763	0.8316	7547	1680
IndpShare	0.0080	0.0339	0.0007	7547	1680
CEOowner	1.9862	5.5427	0.1280	7547	1680
Vega	1.3777	1.7879	0.2755	7547	1680
Big4	0.0970	0.2960	0	7547	1680
Indp	0.8687	0.6507	1.1429	7547	1680
Loss	0.1745	0.3796	0	7547	1680
ROA	0.0484	0.7375	0.0525	7547	1680
Size	7.4314	1.5695	7.2886	7547	1680
Mb	2.8857	20.4541	1.7613	7547	1680
AnaCov	1.1917	0.6546	1	7547	1680
Debt	0.2110	3.6704	0.1442	7547	1680
SalesGrowth	0.1239	0.6528	0.0825	7547	1680
StdCash	0.0430	0.0618	0.0290	7547	1680
StdSales	0.3024	8.7714	0.0778	7547	1680

Notes: This table provides descriptive statistics of the key variables used in the regression analyses. The sample incorporates firm-year observations that contain CEO inside debt information over the period of 2006-2011. The number of firm-year observations varies due to the data requirements in constructing different financial reporting quality proxies for the regression analyses. |*DA*| is the absolute value of abnormal accruals, estimated using the cross-sectional modified Jones model with at least 20 firms for each year and two-digit SIC-code industry. *DA* is the signed value of the abnormal accruals. *DD* is the standard deviation of residuals from the modified Dechow and Dichev model proposed by Francis et al. (2005). The modified Dechow and Dichev regression model is estimated for each two-digit SIC-code industry-year in which there are at least 20 firms. *Res* is equal to 1 if a firm's financial report is misstated for a fiscal year and 0 otherwise. *AnaSur* equals 1 if a firm meets or beats the median consensus analyst earnings forecast by 1 percent over a fiscal year and 0 otherwise. *InsiDebt* takes value of 1 if the ratio of CEO personal leverage to firm leverage exceeds 1 for a fiscal year and 0 otherwise. CEO personal leverage is measured as the sum of actuarial present value of pension and deferred compensation divided by the value of CEO stock and stock option holdings. Firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity. The control variables are defined in appendix I.

Table 2 Univariate test

Variable	*InsiDebt*=1 Mean	*InsiDebt*=0 Mean	Mean difference (t-stat.)	Num. of firm-years
|*DA*|	0.0175	0.0267	-0.0092 (-3.83)***	5596
DA	0.0057	0.0155	-0.0098 (-3.98)***	5596
DD	0.0872	0.1322	-0.0450 (-9.74)***	4238
Res	0.0490	0.0871	-0.0380 (-5.86)***	7547
AnaSur	0.0898	0.0964	-0.0066 (-0.72)	5685

Notes: This table reports the univariate results. The sample incorporates firm-year observations that contain CEO inside debt information over the period of 2006-2011. |*DA*| is the absolute value of abnormal accruals, estimated using the cross-sectional modified Jones model with at least 20 firms for each year and two-digit SIC-code industry. *DA* is the signed value of the abnormal accruals. *DD* is the standard deviation of residuals from the modified Dechow and Dichev model proposed by Francis et al. (2005). The modified Dechow and Dichev regression model is estimated for each two-digit SIC-code industry-year in which there are at least 20 firms. *Res* equals 1 if a firm's financial report is misstated for a fiscal year and 0 otherwise. *AnaSur* equals 1 if a firm meets or beats the median consensus analyst earnings forecast by 1 percent over a fiscal year and 0 otherwise. *InsiDebt* takes value of 1 if the ratio of CEO personal leverage to firm leverage exceeds 1 for a fiscal year and 0 otherwise. CEO personal leverage is measured as the sum of actuarial present value of pension and deferred compensation divided by the value of CEO stock and stock option holdings. Firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity.
***, **, * denote statistical significance at 1%, 5%, and 10% levels (two-tailed tests), respectively.

Table 3
The effect of CEO inside debt holdings on abnormal accruals

Variable	Pred. sign	|*DA*|	*DA*
Intercept	?	0.0376 (4.91)***	-0.0028 (-0.36)
InsiDebt	-	**-0.0080** **(-2.98)*** **	**-0.0096** **(-3.59)*** **
IndpShare	-	-0.0027 (-0.15)	0.0096 (0.53)
CEOowner	+	0.0001 (0.42)	0.0002 (0.66)
Vega	+	-0.0011 (-1.61)	-0.0005 (-0.68)
Big4	-	0.0002 (0.04)	-0.0015 (-0.32)
Indp	-	-0.0007 (-0.52)	-0.0015 (-1.16)
Loss	?	-0.0028 (-0.67)	-0.0100 (-2.34)**
ROA	+	0.0275 (2.62)***	0.0365 (3.60)***
Size	?	-0.0008 (-0.96)	0.0005 (0.51)
Mb	+	0.00003 (1.41)	0.00002 (0.78)
AnaCov	-	0.0006 (0.39)	0.0003 (0.16)
Debt	-	-0.0055 (-2.63)***	-0.0072 (-3.60)***
SalesGrowth	+	0.0045 (1.37)	0.0085 (1.41)
StdCash	+	0.0365 (1.64)	0.0411 (1.97)**
StdSales	+	-0.00001 (-0.54)	0.00001 (1.12)
Insti	?	0.0044 (1.02)	0.0102 (2.38)**
Marginal effect: d(|*DA*|or *DA*)/d(Std.*InsiDebt*)	-	-0.0033	-0.0040
Num. of firm-years		5596	5596
Adj. R^2		0.024	0.062

Notes: This table reports the OLS regression results for the tests of the impact of CEO inside debt holdings on abnormal accruals. The sample period ranges from 2006 to 2011. |*DA*| is the absolute value of abnormal accruals, estimated using the cross-sectional modified Jones model with at least 20 firms for each year and two-digit SIC-code industry. *DA* is the signed value of the abnormal accruals. *InsiDebt* takes value of 1 if the ratio of CEO personal leverage to firm leverage is greater than 1 over a fiscal year and 0 otherwise. CEO personal leverage is measured as the sum of actuarial present value of pension and deferred compensation divided by the value of CEO stock and stock option holdings. Firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity. The control variables are defined in appendix I. Year dummies are included in the regression but not reported for brevity. The t-statistics in parentheses are based on robust standard errors clustered by firm.
***, **, * denote statistical significance at 1%, 5%, and 10% levels (two-tailed tests), respectively.

Table 4
The effect of CEO inside debt holdings on accruals quality

Variable	Pred. sign	*DD*
Intercept	?	0.1156 (3.89)***
InsiDebt	-	**-0.0331** **(-3.97)*** **
IndpShare	-	-0.0969 (-1.36)
CEOowner	+	0.0020 (2.21)**
Vega	+	0.0010 (0.33)
Big4	-	0.0195 (0.97)
Indp	-	-0.0212 (-3.31)***
Loss	?	0.0119 (1.44)
ROA	-	-0.0022 (-5.54)***
Size	?	0.0020 (0.49)
Mb	+	-0.0001 (-1.31)
AnaCov	-	0.0045 (1.02)
Debt	-	-0.9115 (-4.54)***
SalesGrowth	+	0.0010 (0.26)
StdCash	+	0.2591 (3.73)***
StdSales	+	0.0003 (0.46)
Insti	?	0.0037 (0.22)
Marginal effect: d(*DD*)/ d(Std.*InsiDebt*)	-	-0.0138
Num. of firm-years		4238
Adj. R^2		0.057

Notes: This table reports the OLS regression results for the test of the impact of CEO inside debt holdings on accruals quality. The sample period ranges from 2006 to 2011. *DD* is the standard deviation of residuals from the modified Dechow and Dichev regression model proposed by Francis et al. (2005). The modified Dechow and Dichev regression model is estimated for each two-digit SIC-code industry-year in which there are at least 20 firms. Larger *DD* represents poorer accruals quality. *InsiDebt* takes value of 1 if the ratio of CEO personal leverage to firm leverage exceeds 1 for a fiscal year and 0 otherwise. CEO personal leverage is measured as the sum of actuarial present value of pension and deferred compensation divided by the value of CEO stock and stock option holdings. Firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity. The control variables are defined in appendix I. Year dummies are included in the regression but not reported for brevity. The t-statistics in parentheses are based on robust standard errors clustered by firm.
***, **, * denote statistical significance at 1%, 5%, and 10% levels (two-tailed tests), respectively.

Table 5
The effect of CEO inside debt holdings on the likelihood of an earnings misstatement

Variable	Pred. sign	*Res*
Intercept	?	-0.8122 (<0.001)***
InsiDebt	-	**-0.1770** **(0.013)****
IndpShare	-	-0.8569 (0.243)
CEOowner	+	0.0054 (0.159)
Vega	+	0.0228 (0.182)
Big4	+	0.2072 (0.003)***
Indp	-	-0.0915 (0.041)**
Loss	+	0.1611 (0.022)**
ROA	?	-0.2787 (0.170)
Size	?	-0.0687 (<0.001)***
Mb	+	-0.0002 (0.843)
AnaCov	-	-0.0582 (0.107)
Debt	-	-0.4137 (0.008)***
SalesGrowth	+	-0.0064 (0.770)
StdCash	+	-0.1470 (0.692)
StdSales	+	0.0053 (<0.001)***
Insti	?	0.0355 (0.709)
Marginal effect: d(Prob.*Res*) /d(Std.*InsiDebt*)	-	-0.0214
Num. of firm-years		7547
Pseudo R^2		0.047

Notes: This table reports the probit regression results for the test of the impact of CEO inside debt holdings on the likelihood of an earnings misstatement. The sample period ranges from 2006 to 2011. The dependent variable, *Res*, equals 1 if a firm's financial report is misstated for a fiscal year and 0 otherwise. *InsiDebt* takes value of 1 if the ratio of CEO personal leverage to firm leverage exceeds 1 for a fiscal year and 0 otherwise. CEO personal leverage is measured as the sum of actuarial present value of pension and deferred compensation divided by the value of CEO stock and stock option holdings. Firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity. The control variables are defined in appendix I. Year dummies are included in the regression but not reported for brevity. The p-values in parentheses are based on robust standard errors clustered by firm.
***, **, * denote statistical significance at 1%, 5%, and 10% levels (two-tailed tests), respectively.

Table 6
The effect of CEO inside debt holdings on the likelihood of meeting or beating analyst earnings forecasts

Variable	Pred. sign	*AnaSur*
Intercept	?	-1.7038 (<0.001)***
InsiDebt	-	**-0.1458** **(0.015)****
IndpShare	-	-0.5664 (0.530)
CEOowner	+	0.0051 (0.342)
Vega	+	-0.0166 (0.303)
Big4	-	-0.0124 (0.873)
Indp	-	-0.0229 (0.661)
Loss	-	-0.1897 (0.045)**
ROA	?	0.3596 (0.284)
Size	?	0.0718 (<0.001)***
Mb	+	-0.0006 (0.635)
AnaCov	-	0.0425 (0.209)
Debt	-	-0.4206 (0.007)***
SalesGrowth	+	-0.1589 (0.067)*
StdCash	+	-1.2449 (0.068)*
StdSales	+	-0.0815 (0.729)
Insti	?	-0.0393 (0.666)
Marginal effect: d(Prob.*AnaSur*) /d(Std.*InsiDebt*)	-	-0.0213
Num. of firm-years		5685
Pseudo R^2		0.020

Notes: This table reports the probit regression results for the test of the impact of CEO inside debt holdings on the likelihood of meeting or beating analyst earnings forecasts. The sample period ranges from 2006 to 2011. The dependent variable, *Anasur*, equals 1 if a firm meets or beats the median consensus analyst earnings forecast by 1 percent for a fiscal year and 0 otherwise. *InsiDebt* takes value of 1 if the ratio of CEO personal leverage to firm leverage exceeds 1 for a fiscal year and 0 otherwise. CEO personal leverage is measured as the sum of actuarial present value of pension and deferred compensation divided by the value of CEO stock and stock option holdings. Firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity. The control variables are defined in appendix I. Year dummies are included in the regression but not reported for brevity. The p-values in parentheses are based on robust standard errors clustered by firm.
***, **, * denote statistical significance at 1%, 5%, and 10% levels (two-tailed tests), respectively.

Table 7
Test of endogeneity: the effect of CEO inside debt holdings on financial reporting quality

Variable	1st Stage *InsiDebt*	2nd Stage |*DA*|	2nd Stage *DA*	1st Stage *InsiDebt*	2nd Stage *DD*	1st Stage *InsiDebt*	2nd Stage *Res*	1st Stage *InsiDebt*	2nd Stage *AnaSur*
Intercept	-2.2619	0.0075	-0.0204	-2.2604	0.0588	-2.1265	-1.0275	-1.9335	-1.7444
	(<0.001)***	(0.382)	(0.038)**	(<0.001)***	(0.139)	(<0.001)***	(<0.001)***	(<0.001)***	(<0.001)***
InsiDebt		**-0.0651**	**-0.1158**		**-0.1352**		**-1.6348**		**-0.6476**
		(0.019)**	**(0.001)*****		**(0.028)****		**(0.006)*****		**(0.041)****
StateWage	0.0527			0.0486		0.0419		0.0414	
	(0.005)***			(0.008)***		(0.003)***		(0.007)***	
StateInterest	-0.0539			-0.0579		-0.0429		-0.0444	
	(<0.001)***			(<0.001)***		(0.001)***		(0.001)***	
Loss	-0.1186	-0.0037	-0.0110	-0.0733	0.0153	-0.0774	0.1455	-0.0772	-0.1840
	(0.186)	(0.402)	(0.011)**	(0.478)	(0.123)	(0.306)	(0.033)**	(0.386)	(0.051)*
Salesgrowth	-0.5214	0.0034	0.0065	-0.7441	-0.0006	-0.4974	-0.0396	-0.5316	-0.1788
	(0.004)***	(0.621)	(0.606)	(<0.001)***	(0.957)	(0.001)***	(0.727)	(0.003)***	(0.058)*
Size	0.2254	0.0028	0.0073	0.2199	0.0081	0.2119	0.0167	0.2015	0.1007
	(<0.001)***	(0.087)*	(0.001)***	(<0.001)***	(0.216)	(<0.001)***	(0.677)	(<0.001)***	(<0.001)***
Mb	-0.0188	0.00002	0.00001	-0.0105	-0.0001	-0.0100	-0.0002	-0.0066	-0.0009
	(0.149)	(0.905)	(0.963)	(0.356)	(0.952)	(0.244)	(0.988)	(0.434)	(0.800)
Debt	-0.7356	-0.0074	-0.0108	-0.6746	-0.0060	-0.8066	-0.6569	-0.8441	-0.4276
	(<0.001)***	(0.274)	(0.178)	(0.002)***	(0.860)	(<0.001)***	(0.001)***	(<0.001)***	(0.007)***
Insti	-0.1074	0.0015	0.0048	-0.1161	-0.0001	-0.1046	-0.0272	-0.1706	-0.0641
	(0.379)	(0.724)	(0.269)	(0.430)	(0.992)	(0.320)	(0.791)	(0.151)	(0.497)
Indp	0.0644	0.0002	0.0002	0.0857	-0.0188	0.0591	-0.0723	0.0144	-0.0452
	(0.237)	(0.860)	(0.903)	(0.163)	(0.007)***	(0.201)	(0.103)	(0.774)	(0.456)
ROA	0.9002	0.0370	0.0542	1.0761	0.0275	0.8984	-0.1435	0.9923	0.5023
	(0.005)***	(0.006)***	(<0.001)***	(0.003)***	(0.418)	(0.001)***	(0.544)	(0.004)***	(0.145)
IndpShare	0.3963	-0.0003	0.0142	0.7633	-0.0788	0.0514	-0.8753	0.3544	-0.5057
	(0.671)	(0.988)	(0.454)	(0.493)	(0.296)	(0.948)	(0.353)	(0.702)	(0.664)
Big4	0.1596	0.0015	0.0010	0.0924	0.0188	0.0952	0.2329	0.1015	-0.0069
	(0.065)*	(0.722)	(0.840)	(0.371)	(0.339)	(0.192)	(0.001)***	(0.206)	(0.929)
AnaCov	-0.0149	0.0006	0.0001	0.0312	0.0060	-0.0144	-0.0627	-0.0018	0.0445
	(0.669)	(0.748)	(0.934)	(0.423)	(0.198)	(0.649)	(0.110)	(0.958)	(0.179)
Vega	-0.0588	-0.0020	0.0022	-0.0496	-0.0003	-0.0559	0.0026	-0.0538	-0.0241
	(<0.001)***	(0.023)**	(0.030)**	(0.013)**	(0.919)	(<0.001)***	(0.887)	(<0.001)***	(0.141)

CEOowner	-0.0564 (0.075)*	-0.0002 (0.512)	-0.0005 (0.250)	-0.0435 (0.112)	0.0015 (0.106)	-0.0558 (0.010)***	-0.0017 (0.785)	-0.0864 (<0.001)***	0.0001 (0.989)
StdCash	-0.6135 (0.389)	0.0342 (0.175)	0.0368 (0.122)	-1.0820 (0.160)	0.2544 (0.001)***	-0.7539 (0.233)	-0.2313 (0.689)	-0.8228 (0.267)	-1.2896 (0.067)*
StdSales	0.0064 (<0.001)***	0.0001 (0.997)	0.0002 (0.993)	0.0064 (<0.001)***	0.0005 (0.979)	0.0064 (<0.001)***	0.0077 (0.934)	0.3411 (0.153)	-0.1004 (0.616)
Partial F-statistic for instruments	40.67 (<0.001)***			35.07 (<0.001)***		34.05 (<0.001)***		27.70 (<0.001)***	
Num. of firm-years	5596	5596	5596	4238	4238	7547	7547	5685	5685
Adj./Pseudo R^2	0.119	0.028	0.084	0.119	0.047	0.110	0.049	0.114	0.020

Notes: This table presents the regression results for the tests of the endogeneity between CEO inside debt holdings and financial reporting quality. Two-stage instrumental variable regressions are used in the tests. The sample period ranges from 2006 to 2011. The first-step probit estimate shows the determinants of the indicator for CEO relative leverage (*InsiDebt*). *InsiDebt* is the predicted indicator variable for CEO relative leverage, where CEO relative leverage is as defined previously in Table 3-6. The instruments, *StateWage* and *StateInterest*, are the maximum tax rate for wages and the maximum mortgage subsidy rate faced by a CEO in the state in which his or her firm is headquartered, respectively. In the second-stage estimates of the regressions, dependent variables are |*DA*|, *DA*, *DD*, *Res*, and *AnaSur*, respectively. |*DA*| is the absolute value of abnormal accruals, estimated using the cross-sectional modified Jones model with at least 20 firms for each year and two-digit SIC-code industry. *DA* is the signed value of the abnormal accruals. *DD* is the standard deviation of residuals from the modified Dechow and Dichev regression model proposed by Francis et al. (2005). The modified Dechow and Dichev regression model is estimated for each two-digit SIC-code industry-year in which there are at least 20 firms. Larger *DD* represents poorer accruals quality. *Res* equals 1 if a firm's financial report is misstated for a fiscal year and 0 otherwise. *AnaSur* equals 1 if a firm meets or beats the median consensus analyst earnings forecast by 1 percent over a fiscal year and 0 otherwise. When the dependent variable is |*DA*|, *DA*, or *DD* (*Res* or *AnaSur*), OLS (probit) regression model is used for the second-stage regressions. All the control variables are defined in appendix I. Year dummies are included in both the 1st and 2nd stage regressions but not reported for brevity. The p-values in parentheses are based on the standard errors clustered by firm and estimated using 500 bootstrap replications. The bootstrapping procedure is used for the second-stage regression to obtain consistent estimators (Imbens and Wooldridge 2007).

***, **, * denote statistical significance at 1%, 5%, and 10% levels (two-tailed tests), respectively.

Table 8
Additional analysis: the effect of CEO inside debt holdings on firm-specific stock price crash risk

Variable	(a) *Crash*	(b1) 1st Stage *InsiDebt*	(b2) 2nd stage *Crash*
Intercept	-1.1011 (<0.001)***	-2.3171 (<0.001)***	-1.1634 (<0.001)***
InsiDebt	**-0.0917** **(0.018)****		**-0.4702** **(0.049)****
StateWage		0.0351 (0.007)***	
StateInterest		-0.0390 (0.001)***	
Mb	0.0004 (0.201)	-0.0132 (0.079)*	0.0004 (0.275)
ROA	0.7428 (<0.001)***	1.0006 (<0.001)***	0.8006 (<0.001)***
Size	0.0349 (0.004)***	0.2331 (<0.001)***	0.0585 (0.005)***
Debt	-0.5364 (<0.001)***	-0.6817 (<0.001)***	-0.5344 (<0.001)***
Tradevol	0.0037 (0.356)	-0.0579 (0.007)***	-0.0036 (0.377)
Salesgrowth	-0.0942 (0.039)**	-0.4470 (0.001)***	-0.1028 (0.001)***
Stdret	4.0745 (<0.001)***	0.0153 (0.491)	4.0332 (0.027)**
Meanret	-0.2153 (<0.001)***	0.0081 (0.345)	-0.2123 (<0.001)***
Insti	0.1054 (0.052)*	0.0232 (0.416)	0.1020 (0.053)*
Partial F-statistic for instruments		33.61 (<0.001)***	
Num. of firm-years	7708	7708	7708
Pseudo R^2	0.042	0.094	0.042

Notes: The table presents the regression results for the tests of the effect of CEO inside debt holdings on firm-specific stock price crash risk. The sample period ranges from 2006 to 2011. Column (a) reports the single-equation probit regression results. Column (b) reports the two-stage instrumental probit regression results. *Crash* is equal to 1 if a firm experiences one or more firm-specific weekly returns falling 3.2 standard deviations below the mean firm-specific weekly returns over a fiscal year and 0 otherwise. *InsiDebt* takes value of 1 if the ratio of CEO personal leverage to firm leverage exceeds 1 for a fiscal year and 0 otherwise. CEO personal leverage is measured as the sum of actuarial present value of pension and deferred compensation divided by the value of CEO stock and stock option holdings. Firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity. The instruments, *StateWage* and *StateInterest*, are the maximum tax rate for wages and the maximum mortgage subsidy rate faced by a CEO in the state in which his or her firm is headquartered, respectively. All the control variables are defined in appendix I. Year dummies are included in all the regressions but not reported for brevity. The p-values in parentheses are based on the standard errors clustered by firm and estimated using 500 bootstrap replications.
***, **, * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Table 9
Additional analysis: the effect of CEO inside debt holdings on the incidence of an auditor-attested material internal control weakness

Variable	(a) *ICW404*	(b1) 1st stage *InsiDebt*	(b2) 2nd stage *ICW404*
Intercept	-1.5332 (<0.001)***	-3.2505 (<0.001)***	-2.0317 (<0.001)***
InsiDebt	**-0.2050** **(0.045)****		**-1.9370** **(0.023)****
StateWage		0.0306 (0.025)**	
StateInterest		-0.0190 (0.089)*	
ForeignTran	0.3281 (0.182)	-0.7209 (0.011)**	0.1127 (0.421)
Auditchange	0.5356 (<0.001)***	-0.1488 (0.130)	0.4651 (0.002)***
IndpShare	1.0899 (0.074)*	-0.8847 (0.195)	0.8244 (0.174)
Big4	0.0548 (0.355)	-0.0285 (0.387)	0.0265 (0.434)
Indp	-0.2807 (<0.001)***	0.0712 (0.075)*	-0.2594 (<0.001)***
Insti	-0.1803 (0.091)*	0.1447 (0.124)	-0.1382 (0.175)
Loss	0.3942 (<0.001)***	-0.2043 (0.010)***	0.2795 (0.012)**
ROA	0.0834 (0.358)	1.3505 (<0.001)***	0.2746 (0.174)
Mb	-0.0154 (0.234)	0.0005 (0.200)	-0.0126 (0.294)
Numseg	0.0709 (0.128)	0.3626 (<0.001)***	0.2102 (0.017)**
Restruct	-6.2227 (0.423)	-43.8706 (0.129)	-20.8195 (0.349)
SalesGrowth	-0.0139 (0.266)	-0.3221 (0.007)***	-0.0330 (0.306)
Firmage	-0.0563 (0.155)	0.5047 (<0.001)***	0.1439 (0.126)
Partial F-statistic for instruments		32.93 (<0.001)***	
Num. of firm-years	5216	5216	5216
Pseudo R^2	0.100	0.136	0.102

Notes: This table reports the results for the tests of the impact of CEO inside debt holdings on the incidence of an auditor-attested material internal control weakness. Column (a) reports the single-equation probit regression results. Column (b) reports the two-stage instrumental probit regression results. The sample period ranges from 2006 to 2011. The dependent variable, *ICW404*, equals 1 if a firm has a material internal control weakness attested to by auditors for a fiscal year and 0 otherwise. *InsiDebt* takes value of 1 if the ratio of CEO personal leverage to firm leverage is greater than 1 for a fiscal year and 0 otherwise. CEO personal leverage is measured as the sum of actuarial present value of pension and deferred compensation divided by the value of CEO stock and stock option holdings. Firm leverage is calculated as the sum of long-term debt and debt in current liabilities divided by market value of stockholder equity. The instruments, *StateWage* and *StateInterest*, are the maximum tax rate for wages and the maximum mortgage subsidy rate faced by a CEO in the state in which his or her firm is headquartered, respectively. All the control variables are defined in appendix I. Year dummies are included in all the regressions but not reported for brevity. The p-values in parentheses are based on the standard errors clustered by firm and estimated using 500 bootstrap replications.
***, **, * denote statistical significance at 1%, 5%, and 10% levels, respectively.

Appendix I Summary of Variable Definitions

Control Variables	Definition
CEOowner	The sum of CEOs' stock and stock option ownership as a percentage of total shares outstanding as of the end of a fiscal year.
Vega	The natural logarithm of 1 plus the dollar change in the value of CEOs' equity portfolio for 1% change in stock price volatility.
IndpShare	The sum of all independent directors' equity ownership as a percentage of total shares outstanding as of the end of a fiscal year.
Indp	The proportion of independent directors on the board of directors as of the end of a fiscal year.
Insti	Equity ownership of institutional investors as a percentage of total shares outstanding as of the end of a fiscal year.
Loss	1 if a firm reports loss in operating income for a fiscal year and 0 otherwise.
ROA	Income before extraordinary items divided by total assets for a fiscal year.
Size	The natural logarithm of market value of a firm's common shareholders' equity at the beginning of a fiscal year.
Mb	Market value of common shareholders' equity divided by book value of common shareholders' equity at the beginning of a fiscal year.
AnaCov	The natural logarithm of the number of analysts following a firm in a fiscal year.
Debt	The ratio of long-term debt to total assets at the beginning of a fiscal year.
SalesGrowth	Sales in the current fiscal year divided by sales in the previous fiscal year.
StdCash	The standard deviation of cash flows scaled by total assets for the previous five years.
StdSales	The standard deviation of sales scaled by total assets for the previous five years.
Numseg	The natural logarithm of the number of business segments for a fiscal year.
ForeignTran	1 if a firm has a nonzero foreign currency transaction over a fiscal year and 0 otherwise.
Restruct	Restructuring charges scaled by total assets for a fiscal year.
Auditchange	1 if a firm changes its auditor in a fiscal year and 0 otherwise.
Big4	1 if a firm is audited by Big-4 auditors for a fiscal year and 0 otherwise.
Firmage	The natural logarithm of the number of years from the current year to the year when the firm first appeared in the CRSP database.
Tradevol	The average monthly share turnover over a fiscal year. The monthly share turnover is calculated as monthly trading volume divided by total number of shares outstanding during the month.
Stdret	The standard deviation of firm-specific weekly returns for a fiscal year.
Meanret	The mean of firm-specific weekly returns for a fiscal year, times 100.

Appendix II CEO leverage ratio calculation

CEO personal leverage ratio is measured as the value of CEO inside debt holdings divided by the value of CEO equity holdings. The value of CEO inside debt is calculated as the sum of the actuarial present value of accumulated benefits under defined-benefit pension plans and the total balance in the deferred compensation plans by the fiscal year-end, both of which are readily available in ExecuComp.

The value of CEO equity holdings includes the value of both stock and stock option holdings. I measure the value of CEO stock holdings by multiplying the number of shares (including restricted shares) by the stock price at the firm's fiscal year-end. The estimate of stock option value held by CEOs is based on the following Black-Scholes formula for valuing European call options, modified by Merton (1973) to account for dividend payouts.

$$OptionValue = Se^{-dT}N(Z) - Xe^{-dT}N(Z - \delta T^{1/2})$$

Where $Z = [\ln(S/X)+T*(r-d+\sigma^2/2)]/ \sigma T^{(1/2)}$;

N = Cumulative probability function for the normal distribution;

S = Price of the underlying stock at a fiscal year-end;

X = Exercise price of the stock option;

σ = Expected stock return volatility over the life of the stock option;

r = Natural logarithm of risk-free interest rate;

T = Time-to-maturity of the stock option in years

d = Natural logarithm of expected dividend yield over the life of the stock option.

Following Core and Guay (2002), I employ the above formula to estimate the option value for each of the following three groups of stock options held by CEOs: newly granted options in the current year, options granted in previous years but not yet exercisable, and options granted in previous years that are currently exercisable.

The expected stock price volatility (σ) is computed from CRSP using monthly returns over the previous 60 months. The expected dividend yield (d) is computed from Compustat and averaged over the previous three years. Both stock returns volatility (σ) and dividend yield (d) are winsorized at the 1st and 99th percentiles. The risk-free interest rate (r) and the fiscal year-end stock price (S) are obtained from CRSP.

For newly granted options, the exercise price (X) could be directly obtained from ExecuComp. The time-to-maturity (T) is calculated as the difference between option expiration date and option grant date, where the former is obtained from ExecuCom and the latter is assumed to be July 1 of that year. For previously granted options, we need to estimate the exercise price (X) and time-to-maturity (T) since their details are not disclosed in the firm's proxy statements and hence not available in ExecuComp.

To estimate the exercise price (X) for previously granted options, I use the realizable values (i.e., excess of stock price over exercise price) of unexercisable and exercisable options, both of which are obtained from ExecuComp. The realizable value of newly granted options is deducted from that of unexercisable options. The unexercisable (excluding newly granted options) and exercisable realizable values are divided by the number of unexercisable and exercisable options, respectively, to yield an average value of how far in-the-money each stock option is. This average value per option is then subtracted from the firm's stock price to generate the estimates of the average exercise price (X) for the unexercised unexercisable and unexercised exercisable options, respectively.

Based on Core and Guay's (2002) "one-year approximation" (OA) method, the time-to-maturity (T) for unexercised unexercisable options is assigned as 1 year less than the newly granted options. The time-to-maturity (T) for unexercised exercisable options is assigned as three years less than the newly granted options. If no option is newly granted in the current year, the time-to-maturity (T) is set to nine and six years for the unexercisable and exercisable options, respectively. Finally, the value of CEO option holdings is equal to the sum of the value of newly granted CEO options, the value of unexercisable CEO options, and the value of exercisable CEO options.